

**ADMINISTRATOR DESIGNATION OF ONE OR MORE TONES AND/OR ONE OR  
MORE ANNOUNCEMENTS THAT ARE PLAYABLE IN A COMMUNICATION  
SESSION AS INTERRUPTIBLE**

**TECHNICAL FIELD**

5           The invention relates generally to telecommunications and more particularly to tones  
and/or announcements playable in communication sessions.

**BACKGROUND**

          In telecommunication networks, mobile switching centers play tones and/or  
announcements at communication devices. The tones and/or announcements comprise  
10   audible signals playable for users of the communication devices. The mobile switching  
centers may employ the tones and/or announcements for various reasons. For example, some  
tones and/or announcements convey information to the users of the communication devices  
while other tones and/or announcements request information from the users of the  
communication devices. Other tones and/or announcements indicate occurrence of an event  
15   in the telecommunication networks or a condition of the telecommunication network.

          Often users of the communication devices know the meaning of certain tones and/or  
announcements without having to hear the tones and/or announcements play to completion.  
For example, after hearing a tone and/or announcement one or more times, the users of the  
communication devices may remember the meaning associated with the tone and/or  
20   announcement after hearing just a portion of the tone and/or announcement. The tone and/or  
announcement in one example is played at the communication device during a  
communication session, such as a telephone call. After hearing the portion of the tone and/or  
announcement, the users may desire to interrupt the tone and/or announcement to proceed  
with a next phase of the communication session.

Manufacturers of the telecommunication networks in one example hard code one or more announcements as being interruptible by the users of the communication device. For example, the manufacturers of the telecommunication networks may permanently designate the one or more announcements as interruptible prior to deployment of the telecommunication networks. As one shortcoming, the pre-deployment designation of an announcement as interruptible or not interruptible is not dynamically changeable during operation of the telecommunication networks. As another shortcoming, the telecommunication networks do not allow interruption of tones.

Thus, a need exists for a telecommunication network that allows for dynamically provisioned designations of tones and/or announcements. A further need exists for a telecommunications network that allows interruption of tones.

### **SUMMARY**

The invention in one implementation encompasses an apparatus. The apparatus comprises a control component that comprises an interface usable by an administrator to designate one or more tones and/or one or more announcements that are playable in a communication session as interruptible.

Another implementation of the invention encompasses a method. An administrator is interfaced with a configuration database to allow the administrator to designate in the configuration database one or more tones and/or one or more announcements that are playable in a communication session as interruptible.

Yet another implementation of the invention encompasses an article. The article comprises one or more computer-readable signal-bearing media. The article comprises means in the one or more media for interfacing an administrator with a configuration database to allow the administrator to designate in the configuration database one or more

tones and/or one or more announcements that are playable in a communication session as interruptible.

### **DESCRIPTION OF THE DRAWINGS**

Features of exemplary implementations of the invention will become apparent from the description, the claims, and the accompanying drawings in which:

FIG. 1 is a representation of an exemplary implementation of an apparatus that comprises one or more mobile switching centers, one or more configuration databases, one or more base stations, one or more public switched telephone networks, and one or more communication devices.

FIG. 2 is a representation of one exemplary message flow for designation by an administrator for one or more tones and/or one or more announcements to be interruptible upon an interruption request from a communication device of the one or more communication devices of the apparatus of FIG. 1.

FIG. 3 represents exemplary logic that serves to allow the mobile switching center of the one or more mobile switching centers of the apparatus of FIG. 1 to determine whether a tone and/or announcement has been designated by an administrator as interruptible.

FIG. 4 is a representation of one exemplary message flow for interruption of a tone and/or announcement based on an interruption request from a communication device of the one or more communication devices of the apparatus of FIG. 1.

### **DETAILED DESCRIPTION**

Turning to FIG. 1, an apparatus 100 in one example comprises one or more control components, for example, one or more mobile switching centers 102. The apparatus 100 in one example further comprises one or more configuration databases 104, one or more base

stations 106, one or more public switched telephone networks (“PSTNs”) 108, and one or more communication devices 110 and 112. For example, the mobile switching center 102, the configuration database 104, the base station 106, the public switched telephone network 108, and the communication devices 110 and 112 make up portions of a telecommunications  
5 network 114.

The mobile switching center 102 supports one or more mobile telecommunication devices, for example, the communication device 110. In one example, the mobile switching center 102 serves as a serving mobile switching center (“S-MSC”) to support an air interface connection with the communication device 110 through the base station 106. In another  
10 example, the mobile switching center 102 serves as both the serving mobile switching center and an originating mobile switching center to support the air interface connection and call delivery for the communication device 110.

The mobile switching center 102 plays one or more tones and/or one or more announcements at one or more of the communication devices 110 and 112. For example, the  
15 mobile switching center 102 may play a tone/announcement to the communication device 110 in a communication session. The tones/announcements may comprise an audio signal, a tone, an announcement, a tone played along with an announcement, a repeating series of tones, and the like. The tone/announcement may be indicated as interruptible or not interruptible. For example, an administrator may designate the tone/announcement as  
20 interruptible or not interruptible. The administrator in one example designates the tone/announcement as interruptible to allow a user of one of the communication devices 110 and 112 involved in a communication session to force the mobile switching center 102 to stop playing the tone/announcement and continue through the duration of the communication session. For example, the mobile switching center 102 skips a remainder of the tone and  
25 progresses to a next phase in the communication session.

The administrator in one example is associated with a service provider. Thus, the service provider may customize which tones/announcements are interruptible. For example, the service provider may customize a tone and/or announcement service for the communication devices 110 and 112 by designating one or more tones and/or announcements  
5 as interruptible and one or more other tones and/or announcements as not interruptible. In one example, the service provider determines which tones would be beneficial for users to be able to interrupt. In another example, the service provider receives requests from users that are supported by the service provider. The requests may indicate tones/announcements that the user desires to be interruptible. Then, the administrator associated with the service  
10 provider may designate the tones/announcements as interruptible or not interruptible.

If the administrator provisions a tone/announcement as interruptible, then the mobile switching center 102 may stop playing the tone/announcement upon receipt of a termination request from a user of a communication device (e.g., the communication device 110). If the administrator provisions a tone/announcement as not interruptible or the tone/announcement  
15 is indicated as not interruptible, then the mobile switching center 102 continues playing the tone/announcement upon receipt of the termination request.

Exemplary embodiments of tones that may be provisioned by the administrator as interruptible comprise a ring back tone, audible alerting tone, congestion tone, reorder tone, call waiting tone, barge in tone, denial tone burst, incoming additional call tone, and priority  
20 additional call tone. Exemplary embodiments of announcements that may be provisioned by the administrator as interruptible comprise a disconnected number announcement, redirect call announcement, pre-paid card has expired announcement, pre-paid card is invalid announcement, low balance announcement, add area code before dialed number announcement, and dialed number does not exist announcement.

The mobile switching center 102 comprises an interface usable by the administrator to designate tones/announcements that are playable in a communication session as interruptible or not interruptible. For example, the administrator designates the tones/announcements as interruptible or not interruptible in the configuration database 104. The configuration  
5 database 104 stores one or more indications associated with the tones/announcements that are designated by the administrator as interruptible or not interruptible.

The administrator sends requests through the interface of the mobile switching center 102 to the configuration database 104. The interface may comprise a graphical user interface (“GUI”), a signaling path, database update process, or the like. The administrator may  
10 employ the interface to create a new entry in the configuration database 104, set portions of existing entries, or modify existing entries. For example, the administrator may access the configuration database 104 to set a tone as interruptible, then re-access the configuration database 104 to change the designation associated with the tone to not interruptible. The configuration database 104 allows the administrator to change designations associated with  
15 the tones/announcements. The administrator may employ the interface of the mobile switching center 102 to make designations in the configuration database 104 during operation of the mobile switching center 102, for example, the administrator may make changes to the designations after deployment of the telecommunications network 114. Thus, the designations are dynamically changeable by the administrator.

20 The base station 106 communicatively couples the communication device 110 with the mobile switching center 102. The base station 106 supports air interface communication with the communication device 110. The communication device 110 in one example comprises a mobile communication device, such as, a mobile telephone. The public switched telephone network 108 communicatively couples the communication device 112 with the

mobile switching center 102. The communication device 110 in one example comprises a landline communication device, such as, a landline telephone.

The communication devices 110 and 112 may comprise either mobile communication devices or landline communication devices. The mobile switching center 102 plays tones  
5 and/or announcements to the communication devices 110 and 112. A portion of the tones and/or announcements are interruptible. Thus, to interrupt the tone/announcement, the user of the communication devices 110 and 112 sends a termination request to the mobile switching center 102 to request to the mobile switching center 102 to stop playing the tone/announcement. In one example, the communication devices 110 and 112 comprises one  
10 or more buttons to interrupt the tone/announcement. Upon a user of the communication device 110 pressing one or more of the buttons, the communication device 110 sends an indication of the button press to the mobile switching center 102 to initiate an interruption of the tone.

Turning to FIGS. 1-2, an illustrative description of another exemplary operation of the  
15 apparatus 100 is now presented, for explanatory purposes. A message flow 201 represents an exemplary designation by an administrator 202 for one or more tones and/or one or more announcements to be interruptible upon an interruption request from one or more of the communication devices 110 and 112. The mobile switching center 102 comprises an interface usable by the administrator 202 to designate the one or more tones and/or the one or  
20 more announcements that are playable in a communication session as interruptible.

The administrator 202 in one example comprises a service provider associated with one or more of the communication devices 110 and 112. The service provider may customize a tone and/or announcement service for the communication devices 110 and 112 by employing the interface to designate the one or more tones and/or the one or more

announcements as interruptible and one or more other tones and/or one or more other announcements as not interruptible.

To provision tones and/or announcements as interruptible or not interruptible, the administrator 202 sends a provisioning request 206 to the mobile switching center 102. In one example, the provisioning request 206 comprises a list of announcements and/or tones for designation as interruptible. In another example, the provisioning request 206 comprises a list of announcements and/or tones for designation as not interruptible. In yet another example, the provisioning request 206 comprises a first list of announcements and/or tones for designation as interruptible and a second list of announcements and/or tones for designation as not interruptible.

The mobile switching center 102 sends a database update request 208 to the configuration database 104. The configuration database 104 stores indications associated with the tones and/or announcements. The indications represent whether the tones and/or announcements are interruptible or not interruptible. The database update request 208 serves to set or change the indications to the preferences of the administrator 202 that were received in the provisioning request 206.

After updating the indications, the configuration database 104 sends a database update confirmation 210 to the mobile switching center 102. The database update confirmation 210 serves to notify the mobile switching center 102 that the database update request 208 was successful. Upon receipt of the database update confirmation 210, the mobile switching center 102 sends a database update confirmation 212 to the administrator 202. The database update confirmation 212 serves to notify that the provisioning request 206 was successful.

Referring to FIGS. 1 and 3, exemplary logic 301 serves to allow the mobile switching center 102 to determine whether a tone and/or announcement has been designated by the administrator as interruptible. Also, the logic 301 serves to allow the mobile switching center



102 to interrupt the tone and/or announcement if the administrator has designated the tone and/or announcement as interruptible and to continue playing the tone at the communication device 110 if the tone has been designated as not interruptible. The logic 301 employs one or more steps, for example, STEPS 302, 304, 306, 308, 310, and 312.

5           At STEP 302, the user of the communication device 110 in one example initiates a communication session, such as a telephone call with the communication device 112. In one example, the mobile switching center 102 connects the telephone call between the communication devices 110 and 112. In another example, the mobile switching center 102 does not connect the telephone call. For example, at STEP 304, the mobile switching center  
10   102 denies the connection of the telephone call and plays a tone to the communication device 110 to indicate the denied connection.

          The user of the communication device 110 in one example knows the meaning of the tone after listening to a portion of the tone or listening to a portion of a sequence of repeating instances of the tone. Thus, at STEP 306, the user of the communication device 110 sends an  
15   interrupt request through the base station 106 to the mobile switching center 102. For example, the user of the communication device 110 may press a button on the communication device 110 to initiate an interruption of the tone. The mobile switching center 102 interprets the button press as the interruption request.

          At STEP 308, the mobile switching center 102 determines whether the tone is  
20   interruptible. For example, the mobile switching center 102 checks the configuration database 104 to determine whether the administrator has designated the tone as interruptible. If the tone is interruptible, then the mobile switching center 102 proceeds to STEP 310 to stop playing the tone at the communication device 110. If the tone is not interruptible, then the mobile switching center 102 proceeds to STEP 312 to continue playing the tone at the  
25   communication device 110 through the intended duration of the tone.

Turning to FIGS. 1 and 4, an illustrative description of one exemplary operation of the apparatus 100 is now presented, for explanatory purposes. A message flow 401 represents an exemplary interruption of a tone and/or announcement based on an interruption request from the communication device 110. The mobile switching center 102 in one example comprises a switch component 402 and a processing component 404. The switch component 402 and the processing component 404 in one example serve to interface the mobile switching center 102 with the base station 106 and the public switched telephone network 108.

To begin a communication session, the communication device 110 in one example sends a mobile origination message 408 to the base station 106. For example, the mobile origination message 408 serves to indicate to the base station 106 to begin a telephone call with another communication device, such as the communication device 112. The mobile origination message 408 in one example comprises an air interface message, such as an Interim Standard ("IS-95") or ("IS-2000") message.

Upon receipt of the mobile origination message 408, the base station 106 sends an origination message 410 to the mobile switching center 102. For example, the processing component 404 receives the origination message 410. The origination message 410 serves to indicate to the mobile switching center 102 to extend the telephone call to the communication device 112.

Upon receipt of the origination message 410, the processing component 404 sends an origination message 412 to the public switched telephone network 108. The origination message 412 serves to indicate to the public switched telephone network 108 to deliver and connect the telephone call with the communication device 112. The origination message 412 in one example comprises an Integrated Services Digital Network ("ISDN") User Part ("ISUP") message. The public switched telephone network 108 serves to connect the telephone call to the communication device 112. Upon occurrence of an event in the

telephone call, need for information, or need to present information, the public switched telephone network 108 sends a deny message 414 to the processing component 404 of the mobile switching center 102. "NETWORK\_MSC DENY (ERROR ID)" in one example serves to represent the deny message 414. "ERROR ID" serves to represent an error code  
5 that indicates occurrence of a specific error. The processing component 404 maps the error code to a specific tone/announcement playable for the communication device 110. The deny message 414 serves to acknowledge receipt of the origination message 412. Also, the deny message 414 instructs the mobile switching center 102 to play the specific tone/announcement at the communication device 110.

10       Upon receipt of the deny message 414, the mobile switching center 102 accesses the configuration database 104 to determine whether the tone/announcement is indicated as interruptible or not interruptible. For example, the processing component 404 sends a query 416 to the configuration database 104 to request whether the tone/announcement requested by the deny message 414 is interruptible or not interruptible. The configuration database 104  
15 sends an indication of whether the tone/announcement is interruptible or not interruptible in a return result message 418 to the processing component 404.

In one example, the tone/announcement is indicated as not interruptible. Thus, the mobile switching center 102 does not grant any interruption requests from the communication devices 110 and 112 for the tone/announcement. In another example, the tone/announcement  
20 is indicated as interruptible. Thus, the processing component 404 sets the tone/announcement as interruptible in a tone request message 420 to the switch component 402. The tone request message 420 indicates which tone/announcement the switch component 402 should play to the communication device 110.

Upon receipt of the tone request message 420, the switch component 402 sends the  
25 tone/announcement to the base station 106 in a play tone/announcement request message 422.

To play the tone/announcement at the communication device 110, the base station 106 sends a play tone/announcement request message 424 to the communication device 110. The user of the communication device 110 may know the meaning of the tone/announcement without having to hear the tone/announcement play to completion. For example, after hearing a  
5 tone/announcement one or more times, the user of the communication device 110 may remember the meaning associated with the tone/announcement after hearing just a portion of the tone/announcement. After hearing the portion of the tone/announcement, the user may desire to interrupt the tone/announcement to proceed with the telephone call. Thus, the user of the communication device 110 sends an interruption request 426 to the base station 106.  
10 For example, the interruption request 426 comprises a button press by the user of the communication device 110. The button press serves to initiate an interruption of the tone/announcement. The base station 106 forwards the button press to the switch component 402 of the mobile switching center 102 in an interruption request 428. The mobile switching center 102 interprets the button press as a request to stop playing tone/announcement.

15       Upon receipt of the interruption request 428, the switch component 402 of the mobile switching center 102 sends a tone interruption message 430 to the base station 106. The base station 106 sends a corresponding tone interruption message 432 to the communication device 110 to indicate that the mobile switching center 102 has stopped playing the tone/announcement. To acknowledge receipt of the tone interruption message 432, the  
20 communication device 110 sends an interruption acknowledgement 434 to the base station 106. The base station 106 forwards the acknowledgement in an interruption acknowledgement 436 to the switch component 402 of the mobile switching center 102. Upon receipt of the interruption acknowledgement 436, the switch component 402 sends a completion acknowledgement 438 to the processing component 404.

The apparatus 100 in one example comprises a plurality of components such as electronic components, computer hardware components, and/or computer software components. A number of such components can be combined or divided in the apparatus 100. An exemplary component of the apparatus 100 employs and/or comprises a set and/or  
5 series of computer instructions written in or implemented with any of a number of programming languages, as will be appreciated by those skilled in the art.

The apparatus 100 in one example employs one or more computer-readable signal-bearing media. One example of a computer-readable signal-bearing medium for the apparatus 100 comprises one or more instances of the recordable data storage medium of the  
10 mobile switching center 102 and the configuration database 104. For example, the recordable data storage medium comprises one or more of a magnetic, electrical, optical, biological, and atomic data storage medium. In another example, a computer-readable signal-bearing medium for the apparatus 100 comprises a modulated carrier signal transmitted over a network comprising or coupled with the apparatus 100, for instance, one or more of a  
15 telephone network, a local area network ("LAN"), the internet, and a wireless network.

The steps or operations described herein are just exemplary. There may be many variations to these steps or operations without departing from the spirit of the invention. For instance, the steps may be performed in a differing order, or steps may be added, deleted, or modified.

20 Although exemplary implementations of the invention have been depicted and described in detail herein, it will be apparent to those skilled in the relevant art that various modifications, additions, substitutions, and the like can be made without departing from the spirit of the invention and these are therefore considered to be within the scope of the invention as defined in the following claims.